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Omar Yair Rivera Jimenez

IMPORTANT

The information presented here is not intended to replace professional advice in crisis or emergency situations. For the diagnosis and management of any particular condition, it is recommended to consult a certified professional.

Each of the articles compiled here is the sole responsibility of its authors.

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Prologue

In the face of a global obesity epidemic, the field of bariatric surgery continues to evolve, seeking safer and more effective ways to address the complex needs of patients with morbid and super obesity. Robotic surgery has emerged as a transformative tool, combining precision, enhanced visualization, and ergonomic advantages to overcome the technical challenges of operating in patients with high BMI and complex anatomies. This book presents an in-depth exploration of robotic-assisted bariatric procedures, reviewing current evidence, surgical strategies, and clinical outcomes. It aims to equip surgeons and healthcare professionals with critical insights into the future of metabolic surgery, where innovation and evidence-based practice converge to improve patient care.

ROBOTIC SURGERY FOR MORBID OBESITY: OPTIMIZING OUTCOMES THROUGH PRECISION AND INNOVATION

INTRODUCTION

With the rise in the prevalence of obesity, the field of bariatric surgery is witnessing an ever-increasing demand. Along with that, comes the challenge of operating on patients with high body mass index (BMI), revisional bariatric procedures (RBP), managing complications and reoperative abdomens. Performing bariatric surgery can be technically demanding in many situations because of large patients, large livers, thick abdominal walls and substantial visceral fat making exposure, dissection, and reconstruction difficult.

The super obese (SO) patients with a BMI ≥50 kg/m2 is a difficult to manage population because of limited working space, excessive torque on instruments due to thick abdominal wall, co-morbidities and high-risk anesthesia. The management of patients with super-super obesity (BMI >60 kg/m2) also remains a challenge. Moreover, the surgeons encounter very difficult ergonomic positions, which can potentially be career shortening for them. The surgeons have been looking for methods to improve the patient outcomes, surgical technique and decrease complications on one hand, and reducing the number and size of incisions on the other hand. [1]

The first documented case of robotic bariatric surgery took place in 1998 when Drs. Cadiere and Himpens in Belgium performed a robotic-assisted laparoscopic gastric banding. [12] Since that time, the robotic surgical system has undergone several iterations of innovation in regards to the surgical platform's functionality and efficiency. Also, the time period till a surgeon develops expertise with the robotic platform has been truncated, with surgeons in today's era requiring fewer cases to become more proficient with the platform.

Lastly, although still under significant scrutiny in the surgical community, more recent literature suggests that the outcomes of robotic-assisted surgery are improving over time [4]

The advantages of using a robotic approach include easier hand-sewing in anatomically confined spaces, better control of stoma size, a lower likelihood of potential tissue injury, and a possible decrease in wound infection rates. Even in the absence of regulatory committee guidelines supporting the use of robotics in bariatric surgery, bariatric surgeons in the United States of America (USA) have begun incorporating robotics into their routinely performed procedures. In regard to bariatric surgery caseload, there has been a noticeable increase in the number of bariatric surgeries performed annually in the USA, with a rise from 158,000 cases in 2011 to 256,000 in 2019; however, the change in the type of surgical approach used is not as well-described in the literature. [4]

Robotically assisted surgery offers stereoscopic three-dimensional vision with direct camera control by the surgeon, tremor filtration, and articulated instruments with an increased range of motion, which allow for precise dissection and easier hand sewing in anatomically confined spaces. Although the adoption of the robotic platform in bariatric surgery is gaining popularity in Northern America and in Europe, concerns have been raised about higher costs and the lack of evidence demonstrating clear clinical benefits compared with laparoscopic bariatric surgeries.

Robotically assisted bariatric procedures are estimated to cost 2.3 times more per patient than laparoscopic procedures. This is explained by the purchase, maintenance costs, and limited lifespan of the instruments of the robotic platform. A recent literature review found that robotically assisted bariatric surgery was non-inferior to primary laparoscopic bariatric surgeries for perioperative outcomes and advantages of the robotic platform were limited to surgeon ergonomics. The analysis of the Northern American Metabolic and Bariatric Surgery Accreditation and Quality Improvement

Program (MBSAQIP) database showed that secondary robotically assisted bariatric surgery is associated with a lower incidence of postoperative complications (pneumonia, superficial surgical site infections, and bleeding) compared with laparoscopic bariatric surgeries [3]

EPIDEMIOLOGY

Obesity is a chronic, multifactorial and relapsing disease, with a body mass index (BMI) ≥ 30 kg/m2, which affects a large part of the population. The causes are probably associated with a combination of generic, metabolic, behavioral and hormonal factors, which result in a prolonged imbalance between “energy intake and energy expenditure”. As a consequence of obesity, other chronic diseases may occur, causing a large number of morbidities and mortality.

In people with a BMI ≥ 35 kg/m2, premature death may occur. It is also necessary to consider the socioeconomic consequences, such as absenteeism at work, low productivity and high expenditure on health services, therapies and medications1. Regarding prevalence, in the United States, from 2017 to 2018, 42.4% of adults were obese [5]

Among the therapeutic interventions and treatments for obesity, diets, physical activities, behavioral therapies, anti-obesity medications and bariatric surgery (BS) for weight loss are highly recommended, as they will affect both the underlying disease itself and the comorbidities. BS consists of surgically altering the stomach and/or intestine with the aim of causing weight loss in patients with metabolic disorders associated with obesity and its consequences.

BS has shown good results, promoting an improvement in the quality of life of patients and thereby reducing the morbidity and mortality rate and the impact on public health. It is advisable for people with a body mass index greater than 35 kg/m2 or greater than 40 kg/m2, when associated with type 2 diabetes mellitus, high blood pressure, mobility difficulties, bone and joint diseases, cardiovascular diseases, dyslipidemia, obstructive sleep apnea, asthma, metabolic dysfunction associated with hepatic steatosis and steatohepatitis, chronic nephropathy, polycystic ovary syndrome, infertility, pseudotumor cerebri and gastric-esophageal reflux disease. [5]

DEFINITIONS

BARIATRIC SURGERY

Definition: Bariatric surgery functions as metabolic surgery which alters the gastrointestinal tract anatomically and functionally to achieve permanent weight loss and treat obesity-related medical conditions through surgical procedures that span restrictive methods like sleeve gastrectomy to malabsorptive procedures such as biliopancreatic diversion as well as combinations of both techniques.

Key for Surgeons: Emphasizes metabolic effects beyond weight loss, aligning with current "metabolic-bariatric surgery" terminology.

MORBID OBESITY

Definition: Patients qualify for morbid obesity when they present with either:

- **BMI ≥40 kg/m² or BMI ≥35 kg/m²** accompanied by ob**esity-related illnesses** such as (T2DM, OSA, HTN, etc.)
- **Adiposopathy:** Pathologic dysfunction of adipose tissue leads to metabolic disorders and non-surgical therapy fails to manage the disease
- **Failure of non-surgical management** (lifestyle/medical therapy)

Surgical Relevance:

- Indication for bariatric surgery per NIH/ IFSO guidelines
- Robotic approach particularly beneficial in this population due to:
    - Technical challenges (thick abdominal walls, hepatomegaly)
    - Need for precision in complex anatomy

SUPER OBESITY

Definition:

- **BMI ≥50 kg/m²**
- Often associated with:
  - Severe metabolic syndrome
  - Higher perioperative risk (venous thromboembolism, wound complications)
  - Reduced weight loss efficacy with standard procedures

Surgical Relevance:

- May require staged approaches (e.g., sleeve gastrectomy → later bypass)
- Robotic advantages:
  - Enhanced visualization in deep pelvic anatomy
  - Reduced port-site hernias vs. laparoscopy in thick abdominal walls

SUPER-SUPER OBESITY

Definition:

- BMI ≥60 kg/m²
- Extreme physiologic challenges:
    - Ventilatory compromise (obesity hypoventilation syndrome)
    - Cardiac dysfunction (HFpEF)
    - Limited mobility ("bed-bound obesity")

Surgical Relevance:

- Requires multidisciplinary optimization (pulmonology, cardiology, anesthesia)
- Robotic systems enable:
    - Safer access in patients with pendulous abdominal panniculi.
    - Precise dissection in hostile anatomy (e.g., retro-gastric space)

ROBOTIC SURGERY

Definition: A minimally invasive surgical approach utilizing a computer-enhanced platform (e.g., Da Vinci® system) that provides:

- **3D HD visualization.**
- **Instruments with 7 degrees of freedom** for precision movement, tremor filtration with motion scaling technology.
- **Ergonomic surgeon console** to minimize fatigue during complex obesity surgeries.

Key for Surgeons: Highlights technical advantages (precision in confined spaces, reduced surgeon fatigue) critical for complex obesity procedures.

DA VINCI® SURGICAL SYSTEM

Definition: The dominant robotic platform in bariatric surgery, featuring:

- Surgeon console, patient-side cart (with 4 arms), and vision system
- Firefly® fluorescence imaging (for perfusion assessment)
- Integrated staplers/energy devices (e.g., Vessel Sealer®)

Key for Surgeons: Focus on features relevant to obesity surgery (e.g., thick abdominal walls, visceral fat).

ROBOTIC ADJUSTABLE GASTRIC BANDING (AGB)

Definition: A restrictive procedure where a silicone band is robotically placed around the gastric fundus to create a small pouch. Band tightness is adjusted via a subcutaneous port.

Key for Surgeons: Note declining use due to long-term complications (band erosion, slippage) but mention robotic precision in port placement.

ROBOTIC SLEEVE GASTRECTOMY (RSG)

Definition: represents a restrictive bariatric surgery where surgeons use robotic assistance to resect 80% of the stomach along its greater curvature using staplers resulting in a tubular "sleeve".

Key for Surgeons: Robotic advantages:

- **Staple** line reinforcement in thick gastric tissue
- **Reduced** torsion during stapling vs. laparoscopy

ROBOTIC ROUX-EN-Y GASTRIC BYPASS (RYGB)

Definition: A hybrid procedure combining:

Restriction: The formation of a gastric pouch measuring between 15–30 mL

Malabsorption: The Roux limb measures between 75–150 cm and connects to the pouch while incorporating biliopancreatic diversion.

Key for Surgeons: Robotic benefits:

- **Easier intracorporeal anastomoses** (e.g., gastrojejunostomy)
- **Suturing precision** for Petersen's defect closure.

ROBOTIC BILIOPANCREATIC DIVERSION WITH DUODENAL SWITCH (RBPD/DS)

Definition: A malabsorptive procedure involving:

1. **Sleeve gastrectomy**

2. **Duodeno-ileostomy** (distal duodenum to ileum)

3. **Long biliopancreatic limb** (75–100 cm common channel)

Key for Surgeons: Robotic utility:

- **Complex anastomoses** in deep anatomy.
- **Fluorescence imaging** for biliary limb identification.

ROBOTIC REVISIONAL BARIATRIC PROCEDURES (RBS)

Definition: Robot-assisted correction of complications (e.g., fistulas, strictures) or conversion between procedures (e.g., sleeve to bypass).

Key for Surgeons:

- **Adhesiolysis** with robotic precision.
- **Anastomotic revision** in fibrotic tissue.

SINGLE-ANASTOMOSIS DUODENO-ILEAL BYPASS (SADI-S)

Definition: A simplified malabsorptive variant of BPD/DS with:

- **Single duodeno-ileal anastomosis.**
- **200 cm common channel**

Key for Surgeons: Robotic role in **duodenal dissection** and **knotless anastomose**

CLASSIFICATION OF ROBOTIC-ENHACED BARIATRIC PROCEDURES

ROBOTIC ADJUSTABLE GASTRIC BANDING (AGB)

Adjustable gastric banding was the first bariatric procedure performed using a robot. It is technically considered the simplest of all bariatric procedures. The use of AGB has decreased tremendously all over the world because of low efficacy and high revision/complication rate associated with it. There have been few studies published in the literature looking at outcomes of robotic assistance in AGB, and showed little benefit for using the robot Edelson et al. [8] reported the largest study with 287 patients of robotic AGB compared with 120 patients who underwent laparoscopic AGB. No significant differences were found in the operating room (OR) times, hospital stay, complication rates, or excess weight loss. They did find a shorter operative time by 12 min in the robotic arm when compared for SO patients. As of now, robot is used mostly for managing complications and revising gastric band to another weight loss procedure, and this is dealt with in the section on RBS. [1]

ROBOTIC SLEEVE GASTRECTOMY (RSG)

Sleeve gastrectomy involves the removal of 80–85% of the stomach's size. The remaining section of the stomach will resemble a narrow tube or sleeve, limiting the amount of food that can be consumed. As a result, patients feel full faster and consume fewer calories, leading to considerable weight loss. Sleeve gastrectomy also results in the improvement or resolution of several comorbidities, including high blood pressure, hyperlipidemia, gastroesophageal reflux disease (GERD), sleep apnea. [2]

Sleeve gastrectomy is increasingly becoming popular because of its low morbidity, excellent outcome and perceived technical simplicity. It is especially so in Indian sub-continent because of high prevalence of a vegetarian population, who tend to choose a restrictive procedure rather than a malabsorptive one. There are certain peculiarities in SG like it has a long staple line with the potential to leak, and a precise and safe dissection is required in the area of the left crus and hiatus entirely to mobilize the fundus. Compared to laparoscopic surgery, robotic surgery offers the possibility for endowrist, and this action facilitates the hiatal dissection and over sewing of the staple line[1]. Vilallonga et al. [9] reported that the learning curve of performing RSG is over by 20 cases.

In conclusion, interest in the costly robotic platform in sleeve gastrectomy remains limited, but the procedure might be re-evaluated favorably with the use of time-saving robotic stapling devices [15].

ROBOTIC ROUX-EN-Y GASTRIC BYPASS. (RYGB)

Gastric bypass is one of the most popular weight loss surgeries performed globally. This procedure involves creating a small stomach pouch and rerouting the small intestine to it, bypassing a section of the intestine. With this, the food intake decreases, and the body absorbs fewer calories, resulting in rapid weight loss. Gastric bypass surgery can help patients achieve significant weight loss, sustain long-term weight management, and resolve associated health problems such as type 2 diabetes, high blood pressure, sleep apnea. [2]

Roux-en-Y gastric bypass is considered as the gold standard surgical procedure for morbid obesity by many specialists. The overall results are good in terms of both weight loss and comorbidity resolution. As RYGB involves two anastomoses (gastrojejunostomy [GJ] and jejunojejunostomy), robotic surgery is currently considered as an attractive technology that could help perform RYGB, given its well-described advantages It is also the most studied robotic bariatric procedure.

ROBOTIC BILIOPANCREATIC DIVERSION WITH DUODENAL SWITCH (BPD-DS)

Biliopancreatic diversion with duodenal switch (BPD/DS) and revisional surgery are among the most demanding bariatric procedures, and because the robotic system has technical abilities, its assistance might be of value. The former is a multiquadrant procedure consisting of a sleeve gastrectomy, duodeno-ileal anastomosis, ileo-ileal anastomosis, and a common channel of 100–50 cm that to date is mostly performed as an open technique, mainly because of its technical complexity. The procedure has been adopted by a few robotic surgeons, and it has gradually transformed from a double-docking to a single-docking procedure. Sudan et al. reported no leaks, no bleeding, and no conversions in 59 totally robotic procedures for BPD/DS [15].

As such, robotic-assistance appears appealing for such complex cases, and it can be assumed to bring clinical value when compared with conventional techniques. However, today, the body of evidence is very limited. Few reports indicate the efficiency of robotics for revisional surgery, but overall complication rates range from 0% to 17% with adequate postoperative loss of excess weight.50-52 However, the precision of robotics for revisional surgery must be further evaluated [15].

ROBOTIC REVISIONAL BARIATRIC PROCEDURES (RBS)

Revisional bariatric surgery, also known as revision bariatric surgery, is surgery performed on patients who have had previous bariatric surgery but failed to achieve the desired results or developed complications. The primary goal of revisional bariatric surgery is to correct or improve the unsatisfactory results of the initial surgery. This may include converting from a restrictive procedure to a malabsorptive or combined procedure, or vice versa, in order to achieve more significant weight loss or to reduce the associated complications. [2]

Revisional cases are the third most common type of MBS in the United States (US), with over 30,000 revisions performed each year on average since 2016.

RBS can be technically challenging due to the presence of altered anatomy in reoperative fields with adhesions. Consequently, RBS is generally associated with higher morbidity and longer operative times compared to primary MBS. The rise of robotic surgical platforms, with their improved dexterity and visualization, has led many to apply this new technology to revisional MBS in an effort to overcome the shortcomings of conventional laparoscopy [6]

Basically, the indication for RBS falls into one of the following scenarios:

- Inadequate weight loss.
- Weight regains.
- Persistence or recurrence of comorbidities.

- Postoperative complications of the primary bariatric procedure.

The types of revisional procedures are as follows:

- **Revision or correction,** which implies the abdominal exploration and re-evaluation of the anatomy, usually in an attempt to address refractory symptoms.
- **Conversion,** in which a specific bariatric procedure is converted into another type of bariatric procedure.
- **Reversal,** where the original anatomy is reestablished.

Hence, the indications and types of RBS vary according to the index procedure and the necessity of a subsequent intervention. Recent estimates indicate that the incidence of RBS ranges from less than 5% to 26%. Revisional rates according to the primary procedure reported in the literature are as follows: 40–60% for adjustable gastric banding (AGB), 25–54% for vertical banded gastroplasty, 30% for sleeve gastrectomy (SG), 10–20% for Roux-en-Y gastric bypass (RYGB), and 5% for biliopancreatic diversion with duodenal switch [7]

SINGLE-ANASTOMOSIS DUODENO-ILEAL BYPASS (SADIS)

Since its introduction in 2007 as a simplified procedure derived from biliopancreatic diversion with duodenal switch (BPD/DS), single-anastomosis duodeno-ileal bypass (SADIS) has been increasingly adopted in the treatment of morbid obesity due to its reduced operative risk and weight loss and remission of metabolic disease comparable to that of BPD/DS.

Although traditionally performed laparoscopically, the recent introduction of robotic surgical systems has led to the application of robotics in SADIS procedures. SADIS is a surgical procedure that combines malabsorption with gastric restriction; in recent years, it is increasingly finding use especially for its short-term weight loss and reduction of complications compared to biliopancreatic diversion or duodenal switch. [2]

ROBOTIC-ENABLED SURGICAL EXCELLENCE: ADVANTAGES IN MORBID OBESITY MANAGEMENT

Surgical robots have been designed to excel the limitations of conventional laparoscopy. Whereas laparoscopy involves a two-dimensional view displayed on a monitor, robotic surgery offers a close three-dimensional vision portrayed in the commodity of a console, which gives the surgeon a feeling of operating from inside the cavity.

Laparoscopy has been described as counterintuitive, given the mirror-image effect of the camera—when the camera is in front, moving an instrument to the right appears on the left. Moreover, if the camera is unsteadily held by an assistant, the surgeon is forced to adopt unpleasant positions, and the slightest hand tremor is transferred onto the rigid, straight instruments.

Robotic systems such as the Da Vinci Xi® (Intuitive Surgical, Sunnyvale, CA) provide active camera, multi-quadrant access, improved precision of motion, filtered tremor, and instruments with endowrist movements and seven degrees of freedom, powerfully enhancing the dexterity of the surgeon. [7]

Furthermore, the robotic system allows for combination with fluorescence imaging, representing one of the most innovative technologies. Indocyanine green injection produces an angiography-type of image displayed on a monitor, enabling a more precise assessment of bowel perfusion, and guiding decisions on bowel transection intraoperatively.

The robotic platform is advantageous in operations involving reduced, fixed, deep operating fields, or those requiring extreme accuracy, such as micro-anastomosis and fine dissection. This represents the case of RBS, in which adhesions between the internal organs are common, and tissues and vasculature have become frail, producing a hostile abdomen. RBS often implies the confection or re-confection of strenuous intestinal anastomosis, an overwhelming task for laparoscopic instruments. In this scenery, in which an extremely cautious dissection and interpretation of an altered anatomy are crucial, the robot could provide certain benefits. [7]

STRATEGIC CONSIDERATIONS: UNDERSTANDING ROBOTIC SURGERY'S CURRENT LIMITATIONS

Almost unanimously, the major drawbacks of the robot are the prolonged operative times and higher costs. The up-front cost to purchase the Da Vinci® Surgical System is estimated at 1 to over 2 million US dollars, with annual maintenance costs of about 10% of this price, plus instrument expenditures [15].

Another disadvantage of robotic technology is its increased operative time. Operative time depends on the learning curve and is directly related to the costs and complications of the operation. Crucially, the learning curve is not just about the individual technical skills of a surgeon, but also involves the knowledge and capacity of the surgical team during set up, docking, and instrument exchange [13]. As with every new device, it takes time for the surgical team to become acquainted. Finally, once the learning curve of the platform is overcome and better outcomes (i.e., complications) are achieved, the cost-effectiveness of the robot will probably outshine conventional laparoscopy [16].

An infrequently reported, but not minor, disadvantage of the robot is the relative impairment to execute fast changes in patient positioning, as these require removing the instruments and re-docking the platform. This makes the platform less suitable for procedures involving major postural changes during different steps of the operation [11]. In addition, evidence on the role of the robot in surgical emergencies is scarce and remains under investigation [17].

OUTCOMES AND PROGNOSIS OF ROBOT-ASSISTED BARIATRIC SURGERY

The utilization of the robotic platform for both primary and RBS has experienced a steady increase in the last few years. The robotic approach was first used in the field of bariatric surgery by Himpens et al., who performed a robotic AGB in 1998 [12]. In 2000, Sudan et al. performed and published the first series on robotic biliopancreatic diversion with duodenal switch, in which

SG was a step of the procedure. Moreover, robot-assisted RYGB was adopted in the early 2000 s with an initially hybrid procedure in which only the hand-sewn gastro-jejunal anastomosis was conducted with the robotic platform. Around the year 2008, RYGB was almost fully performed with a robotic system, except for the use of the stapler, which was handled by a bedside assistant, as the first da Vinci stapler was launched in 2014.

The sequential adoption of the robotic platform for primary bariatric procedures, together with the tendency to use this device in more complex cases, resulted in its increasing utilization in RBS in the last decade.

THE LEARNING CURVE

One of the most appealing aspects of the robot is its learning curve. Although the number of cases required to reach the learning curve for robot-assisted bariatric surgery has not been established, several studies illustrate a decreased learning curve with the use of this technology when compared to its laparoscopic analogous.

Regarding the learning curve for laparoscopic operations, Wehrtmann et al. [14] determined that 30–50, 60–100, and 100–200 laparoscopic SG were needed to achieve “competency”, “proficiency”, and “mastery”, respectively, whereas 30–70, 70–150, and up to 500 cases were needed for laparoscopic RYGB, respectively. The number of laparoscopic cases reported in this systematic review seemed significantly higher than those reported for robotic procedures. This provides additional evidence suggesting the robotic platform has a faster learning curve.

Nevertheless, the robotic platform is still an emerging technology, and most surgeons have not yet met its learning curve. As a result, the robotic surgical outcomes reported in the literature may fail to reflect the real advantages of the device. That said, a consistent decrease in operative times has been observed with increasing surgeon experience, particularly when transitioning from the hybrid to the fully robotic approach.

FUTURE-OPTIMIZED PRACTICE: TRANSLATING EVIDENCE INTO ROBOTIC INNOVATION

The potential of the robotics in metabolic surgery in RBS seems promising if we consider that this technology has already demonstrated perioperative results comparable to those of conventional laparoscopy. The published studies may be reporting outcomes of an early stage of device- training. As aforementioned, the learning curve is directly related to the increased operative time and costs, so improved outcomes are expected to become evident once this liability is overcome. [7]

The data presented in our analyses demonstrates a nationwide increase in the utilization of a robotic approach in bariatric surgery. Given the concerns related to the potential increase in healthcare expenditures related to this novel technology, it is important to conduct further studies to establish well agreed upon key performance indicators comparing the robotic approach to the standard laparoscopic approach in conjunction with establishing guidelines for training, adoption, and utilization. [4]

Bariatric surgery, a major procedure used to treat obesity and related conditions, has seen significant advancement with the introduction of robotic technology. However, an evaluation of the existing evidence shows conflicting results regarding the effectiveness, safety, and costs associated with the use of robotic surgery compared to laparoscopy, especially in different types of bariatric surgeries such as gastric bypass, sleeve gastrectomy, revisional bariatric surgery, and SADIS. [2]

While robotic surgery may have technical advantages, such as three-dimensional visualization and wrist-worn instruments, it may require longer operative times and higher costs. However, experience and practice can reduce operative times and improve the effectiveness of robotic surgery, making it a valid option in particular complex cases. Despite the advancements in robotic surgery, further research is imperative to gain a comprehensive understanding of the benefits, costs, and optimal practices when integrating robotic technology into various bariatric procedures. Essential to this understanding are long-term prospective and randomized studies that can delineate the precise role of robotic surgery and conduct a thorough comparison of its advantages and disadvantages relative to laparoscopic surgery within the realm of bariatric procedures. [2]

Robotic surgery, characterized by its technical advantages, notably enhanced visualization, and the incorporation of specialized instruments, is an evolving frontier in the realm of medical interventions. Despite its innovative features, the utilization of robotic surgery frequently comes with trade-offs, including extended operative times and escalated associated expenses. This necessitates a thorough exploration of the nuanced landscape surrounding robotic approaches, particularly in the context of bariatric procedures, where varying outcomes have been discerned through comparative studies. These comparative studies, conducted across different bariatric procedures, provide insights into the multifaceted nature of robotic interventions. While they showcase comparable effectiveness in certain aspects, such as enhanced precision and improved visualization, they also unveil potential drawbacks.

Among these drawbacks are the proclivity for longer hospital stays and the possibility of specific complications associated with robotic surgery. Thus, the decision to employ robotic approaches in bariatric procedures necessitates a careful consideration of the benefits and drawbacks inherent in these advanced techniques. Despite the promising features of robotic bariatric surgery, the current body of research on this subject remains somewhat limited.

Nevertheless, the available evidence contributes to a preliminary understanding, suggesting that, on the whole, robotic interventions are deemed safe and represent a valid treatment option in the field of bariatric surgery. This tentative conclusion underscores the need for continued research and exploration to further elucidate the specific contexts and conditions under which robotic surgery can provide optimal benefits while minimizing potential drawbacks. As technology and research progress, the comprehensive evaluation of robotic bariatric surgery's efficacy and safety profiles will likely continue to evolve, shaping the future landscape of surgical interventions in the realm of obesity treatment. [2]

The learning curve of robotic RYGB has also been shown to be shorter as compared to laparoscopic RYGB. [10] The entire team learns with the surgeon and develops experience about patient safety precautions, OR set-up, and type of instruments needed, thus leading to better OR times with better patient outcomes.

Robotic surgery is a team effort, and more so in bariatric surgery, where the role of an experienced bedside surgeon cannot be understated, as he is responsible for stapling (if robotic staplers are not used). As the main surgeon is separated from the patient, while performing robotic surgery, the assistant surgeon has to be trained enough to help him perform difficult tasks and also to take care of any emergency situation arising during the procedure. The role of a trained scrub nurse and OR technician is also very important in streamlining the conduct of the procedure and prevent any wastage of time and resources. [1]

At the end of the day, the big question to be answered is whether the use of robotics is going to stay or will it perish with time like many fancy technologies. Looking at the basic concept of computer-assisted navigational surgery, robotics provides an enabling platform in between surgeon and the patient. It provides augmented and higher quality inputs from the patient to the surgeon, and his output is refined to a superior quality before reaching back to the target. According to us, this should not be analyzed in terms of features of the present machine that is available for use, but in terms of the potential in the concept of using a digital interface to interact with patients and enhance the performance of the surgeon. With the advent of newer technologies in robotics like fluorescence, integration of images, virtual and augmented reality, telesurgery, single site platforms, natural orifice surgery and haptic feedback, we believe that it will provide an empowering tool to the surgeons, which can potentially change the way surgery is practiced today. [1]

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